REMARKS - General

By the above amendment, applicant has amended the drawings, specification, and abstract to emphasize the novelty of the present invention.

Application has currently amended all of the claims to define the present invention more particularly and distinctly so as to overcome the technical objections and rejections and define the present invention patentably over the prior art references.

The Objection To The Specification Objections

Applicant has currently amended all of item informalities and/or minor errors in the specification and abstract. Accordingly, applicant submits that the specification and abstract complies with Examiner's requirements and therefore requests reconsideration and withdrawal of the objections.

The Objection To The Claims Objections

The claims 1 – 28 objected to because of the following informalities as stated in the Office Action.

Applicant has currently amended all of above claims with correct informalities based on Examiner's requirements. Accordingly, applicant submits that the amended claims comply with Examiner's requirements and therefore requests reconsideration and withdrawal of the objections.

The Rejections Of The Claims 1-28 Under 35 USC 112 Are Overcome

The claims 1 – 28 were rejected under 35 USC 112 because there are reasons listed from 3 – 13 as stated in the Office Action.

Applicant has currently amended all of the claims along with the specification. Accordingly, applicant submits that the amended claims comply with Examiner's requirements and therefore requests reconsideration and withdrawal of the rejections under 35 USC 112.

The Objection To The Double Patenting Is Overcome

The office action rejected the independent claims 1 and 16 as a double patenting over the copending Application No. 10/653651.

Applicant has currently amended the independent claims 1 and 16. Accordingly, applicant submits the amended independent claims, which are completely different from the claims in Application No. 10/653651, and therefore requests reconsideration and withdrawal of the double patenting objection.

The Rejection Of The Claim 1 on Lakkis (US 7031371) Under 35 USC 102(e) Is Overcome

The office action rejected the independent claim 1 over the patent of Lakkis (US 7031371).

The independent claim 1 has been currently amended. Accordingly, applicant submits the amended independent claim 1 and therefore requests reconsideration and withdrawal of the rejection under 35 USC 102.

The Rejection Of The Claim 16 on Shattil (US 2004/0086027) Under 35 USC 102(e) Is Overcome

The office action rejected the independent claim 16 over the patent application of Shattil (US 2004/0086027).

The independent claim 16 has been currently amended. Accordingly, applicant submits the amended independent claim 16 and therefore requests reconsideration and withdrawal of the rejection under 35 USC 102.

All of the currently amended claims 1 - 28 are to emphasize the novelty of the present invention and to define patentably over these prior-art references thereof. Applicant requests reconsideration of these rejections, as now applicable to the amended independent claim 1 and the corresponding amended dependent claims 2 – 15, and the amended independent claim 16 and the corresponding amended dependent claims 17 –

26, and the amended independent claim 27 and the corresponding amended dependent claim 28 for the following reasons:

(1) There are no justification, in Lakkis and Shattil, or in any other prior arts separate from applicant's disclosure, which suggest that these references be individual way in the manner proposed.

(2) Even if Lakkis and Shattil were in the manner proposed, the proposed methods would not show all the novel physical features of the amended claims 1 - 28.

(3) These novel physical features of the amended claims 1 - 28 produce new and unexpected results in such a way that proposed the multiuser DSSS-OFMD multiband for UWB Communications completely operates in different methods and deals with different UWB signals in different situations that Lakkis and Shattil, or any other prior arts suggested, and therefore are novelty, unobvious and patentable over these prior-art references.

The References And Differences Of The Present Invention Thereover

Prior to discussing the amended claims and the above three points, applicant will first discuss the prior-art references and the general novelty of the present invention and its unobviousness over these prior-art references.

Present Invention - The present invention is a next-generation multiuser DSSS-OFDM multiband UWB communications based on direct sequence spread spectrum and orthogonal frequency division multiplexing technologies for indoor UWB operations. The present invention employs novel transmitter and receiver architectures, including multiband splitter, FFT, filtering, multiband multicarrier modulation, multiband QPSK modulation, multiband demodulation, frequency-domain equalizer, and multiband combination. The invented UWB communication system utilizes eleven frequency bands, with each of the frequency bands having 650 MHz and 1,000 subcarriers, thereby allowing multiuser to access an UWB network at the same time and transmitting different data rates with scalability up to 5.541 Gbps, which is far beyond these prior-art individual

references' capabilities. Furthermore, the invented UWB communication system not only meets FCC requirements of the indoor UWB emission limitations but also eliminates interference with WLAN 802.11a devices by controlling one of the frequency bands and/or subcarriers in the each of the frequency bands. This permits that the invented UWB communication system can be operated with multi-devices without interference in the same indoor environments.

Lakkis presented a CDMA/TDMA communication method and apparatus for wireless communication using cyclic spreading codes, including a multiuser encoding and spreading unit (Fig. 3, elements 58, 74), a polyphase-based multiband (col. 11 lines 4-12), an IFFT unit (Fig. 3, 12), a filter unit (col. 5 line 62 – col. 16 Lines 16), and a multiband-based modulation and multicarrier (Fig. 3, element 44, abstract, col. 1 lines 34 – 49).

It can be seen that the multiuser encoding and spreading unit (Fig. 3, elements 58, 74) has an encoder and interleaver, and spreading section output. Both of the encoder and interleaver and spreading section output are not connected each other. There are many other functions have to be used in between to connect with the encoder and interleaver and spreading section output. Thus, Lakkis's multiuser encoding and spreading unit is completely different from what the present invention uses the encoder and interleaver and multiuser keys.

Note that Lakkis's polyphase-based multiband (col. 11 lines 4-12) is referred to as the OFDM in col. 11 lines 4 – 12. Thus, Lakkis's polyphase-based multiband is completely different from what the present invention use the polyphase-based multiband (now called multiband splitter) as shown in Fig. 3.

Note that Lakkis's IFFT unit outputs (Fig. 3, 12) are multiplied by a set of coefficients in parallel and then added together. However, the present invention's IFFT outputs are separated into even outputs and odd outputs. The even outputs are sequentially connected with an switch and then passed through a digital transmission filter followed by a D/A converter while the odd outputs are also sequentially connected with a switch and then passed through another digital transmission filter followed by

another D/A converter. As can be seen, Lakkis's IFFT unit is completely different from what the present invention uses the IFFT unit.

Further note that Lakkis's filter unit (col. 5 line 62 – col. 16 Lines 16) is used to multiply all of outputs of the IFFT unit. In other word, multi-outputs of the IFFT unit are operated with filter unit that produces multi-output. Then the multi-outputs of the filter unit are added together. The filter is not designed to meet FCC UWB emission limitation. However, the present invention use two digital transmission filters. One digital transmission filter is used to filter output of an even switch output, which is connected with even position of output of the IFFT unit sequentially. Another digital transmission filter is used to filter output of an odd switch output that is connected to odd position of the output of the IFFT unit sequentially. In addition, the present invention's digital transmission filter spectrums meet FCC UWB emission limitation for the indoor operations. Therefore, Lakkis' filter unit is completely different from what the present invention uses the two digital transmission filters for the indoor UWB operations.

Note that Lakkis' multiband-based modulation and multicarrier (Fig. 3, element 44, abstract, col. 1 lines 34 – 49) includes a DEMUX coupled to a spread section that is connected to a P/A reduction followed by a combining section over a single channel. The present invention uses a multiband-based modulation and multicarrier (now called multiband multicarrier modulation) as shown in Fig. 6, which contains M bit detectors connected with M multiband QPSK modulations in parallel. The outputs of the M multiband QPSK modulations are added together to pass through an analog bandpass filter. Therefore, it is clear that Lakkis's multiband-based modulation and multicarrier is completely different from the present invention's multiband-based modulation and multicarrier for UWB operations.

As results, Lakkis's invention is used for CDMA/TDMA approach while the present invention is used for the indoor UWB operations. Therefore, there are fundamental difference between Lakkis's invention and the present invention.

Shattil disclosed an orthogonal superposition coding for direct-sequence communication, including a combination section of a multiband multicarrier down

converter and demodulation, and A/D unit, and a digital receiver filter unit (Figure 1, Elements 122, 124, 125, 129, paragraphs 2, 4, 5, 90, 102, 161, 178), a FFT and FEQ section (Figure 1 elements 127 – 128), a polyphase-based demultiband (paragraphs 2, 4, 5, 102, 161, 178), a dispreading, deinterleaving and decoding section (Figure 1 elements 131 – 132, paragraph 45).

Note that Shattil's multiband multicarrier down converter and demodulation, and A/D unit, and a digital receiver filter unit (Figure 1, Elements 122, 124, 125, 129, paragraphs 2, 4, 5, 90, 102, 161, 178) has a digital receiver filter (element 129) but it is placed after a FEQ. Thus, it is clear that this cannot provide a digital receiver filter function to receive an inband signal. Thus, the element 129 is not a digital receiver filter. Indeed, it is a demap processing. In addition, Shattil's multiband multicarrier down converter and demodulation, and A/D unit, and a digital receiver filter unit can only deal with a channel signal. Such an approach cannot be used for a multiband processing. Furthermore, Shattil's multiband multicarrier down converter and demodulation, and A/D unit, and a digital receiver filter unit is not designed for an UWB signal. Therefore, it cannot be used to receive a multiband UWB or even a single UWB channel signal. The present invention's multiband multicarrier down converter and demodulation, and A/D unit, and a digital receiver filter unit (as shown in Figures 11 and 12) has an analog bandpass filter coupled to 11 multiband QPSK downconverter and demodulations followed by 22 A/D converters and 22 digital receiver filters. It is specially in designing for a multiband UWB communications for indoor operations. It is able to receive very low power transmitted UWB signals under FCC emission requirements and very high data rates up to 5.541Gbps with scalability. It is impossible for Shattil's system to receive such a high data rate. Thus, there are many differences not only in all of the subsystem connections but also in fundamental operations between the present invention's multiband multicarrier down converter and demodulation, and A/D unit, and a digital receiver filter unit and Shattil's multiband multicarrier down converter and demodulation, and A/D unit, and a digital receiver filter unit. Therefore, Shattil's multiband multicarrier down converter and demodulation, and A/D unit, and a digital receiver filter unit is

different from the present invention's multiband multicarrier down converter and demodulation, and A/D unit, and a digital receiver filter unit.

Note that Shattil's FFT and FEQ section (Figure 1 elements 127 – 128) includes a FFT coupled to a FEQ for a signal channel operation. The present invention's FFT and FEQ unit has 11 FFTs coupled to 11 FEQs in parallel (as shown in Figures 10 and 13), which are connected with a channel estimator. In addition, each of FFTs has 1024 inputs and 500 complex outputs. Each of FEQs contains 500 equalizers, 500 decision detectors, 500 subtractions, and an adaptive algorithm. The 500 complex outputs of each FFT are directly connected to 500 equalizers in each FEQ. This allows dealing with a large multicarrier in each of multiband. Thus, Shattil's FFT and FEQ section is different from the present invention's FFT and FEQ unit.

Note that Shattil's polyphase-based demultiband (paragraphs 2, 4, 5, 102, 161, and 178) is not the same as the present invention's a novel architecture of polyphase-based demultiband (now called multiband combination) as shown in Figure 14. As can be seen, the present invention's polyphase-based demultiband is used to perform demultiband operation and has a different structure that Shattil's polyphase-based demultiband does. Thus, it is clear that Shattil's polyphase-based demultiband is different from the present invention's polyphase-based demultiband (or now called multiband combination).

Further note that Shattil's dispreading, deinterleaving and decoding section (Figure 1 elements 131 – 132, paragraph 45) is a deinterleaver followed by a decoder. The present invention's dispreading, deinterleaving and decoding section as shown in Figure 15 includes an input signal multiplied by a user key to produce a despreaded sequence, which it is used for a decoder to generate the user bitstream. Thus, it can be seen that Shattil's dispreading, deinterleaving and decoding section is different from the present invention's dispreading, deinterleaving and decoding unit.

In summary, **Lakkis and Shattil** are arts but they are different from each other. Lakkis presented the CDMA/TDMA communication method and apparatus for wireless communication using cyclic spreading codes. Shattil invented the orthogonal

superposition coding for direct-sequence communication. They are for individual different design methods and different communication systems. Applicant's invention is the multiuser DSSS-OFDM multiband for UWB communications. It is especially designed for wireless UWB communications that meet the FCC emission requirements for the indoor UWB operations. Furthermore, it is an UWB communication device along with a set of novel architectures that enable to transmit a very-high UWB data rate up to 5.541 Gbps with scalability and programmability. In addition, it is also designed to avoid interference with other WLAN devices during operations by using a multiband multicarrier solution. Therefore, application's invention of using a multiuser DSSS-OFDM multiband solution for UWB communications is fundamentally different from Lakkis, and Shattil's systems or any combination thereof. As a result, it is impossible and unobvious to one having ordinary skill in the art to develop the multiuser DSSS-OFDM multiband for UWB communications even given Lakkis, and Shattil's prior-art references.

Lakkis and Shattil Do Not Contain Any Justification To Support Individual, Much Less In The Manner Proposed

With regard to the individual inventions of Lakkis, and Shattil, it has been shown that there are fundamentally differences between the applicant's invention and the individual inventions of the prior-art references as the applicant discussed above. The fact that all of the prior-art references either in individual or any combination form is not sufficient to gratuitously and selectively substitute parts of one reference for a part of another reference in order to meet the applicant's novel claims because there are fundamental differences between the applicant's invention of the multiuser DSSS-OFDM multiband for UWB communications and Lakkis's CDMA/TDMA communication method, and Shattil's orthogonal superposition coding for direct-sequence communication approach. Thus, it is invalid to use any prior-art references to reject the applicant's invention under 35 USC 102(e). Therefore, the applicant submits the fact that the multiuser DSSS-OFDM multiband for UWB communications produces advantages militates in favor of the applicant because it proves that the applicant's invention produces new and unexpected results and hence is unobvious.

Therefore, the applicant submits that individual forms of Lakkis and Shattil are not legally justified and is therefore improper. Thus, the applicant submits that the rejection on these prior-art references is also improper and should be withdrawn.

Even If Lakkis, and Shattil Were In The Manner Proposed, The Proposed methods Would Not Show All The Novel Physical Feature Of the Claims 1 - 28

However, even if Lakkis and Shattil individual forms were legally justified, the amended claims 1 - 28 would still have novel and unobvious physical features over the proposed individual forms. In other words, the applicant's invention, as defined by the amended claims 1 - 28, comprises much more than merely substitutes a plurality of templates to one template. Furthermore, there are fundamentally differences between the applicant's invention of the physical feature architecture and expected results, and any individual forms of the prior-art references. It is also clear that the applicant's invention has novel and unobvious physical features over any prior-art references.

Thus, the applicant submits that the present invention of the multiuser DSSS-OFDM multiband for UWB communications is much more than merely substituting a plurality of templates for one template and that the amended claims 1 - 28 clearly recites novel physical subject matter, which distinguishes over individual or any possible combination of Lakkis and Shattil.

The Novel Physical Features Of the Claims 1, 16 and 27 Produce New And Unexpected Results And Hence Are Unobvious And Patentable Over These References Under 35 USC 102

The applicant also submits that the novel physical features of the amended independent claims 1, 16 and 27 are unobvious and hence patentable under 35 USC 102 since they produce new and unexpected results over Lakkis and Shattil thereof.

These new and unexpected results are the ability of the applicant's invention of the multiuser DSSS-OFDM multiband for UWB communications not only to transmit a very-high UWB data rate up to 5.541 Gbps with scalability and programmability and to meet FCC emission limitations for the indoor operations but also to avoid interference

with WLAN devices, thereby achieving co-existence with multiple communication devices in the same indoor environments.

Therefore, the applicant's invention of the multiuser DSSS-OFDM multiband for UWB communications is a novel and vastly superior to that of either Lakkis or Shattil's individual form thereof. The novel physical features of the applicant's invention of the multiuser DSSS-OFDM multiband for UWB communications that affect these differences are, as stated, clearly recited in the amended independent claims 1, 16 and 27.

The Dependent Claims Are A Fortiori Patentable Over Lakkis, and Shattil

The amended dependent claims 2 – 15, the amended dependent claims 17 - 26, and the amended dependent claim 28 incorporate all the subject matter of the amended independent claims 1, 16, and 27 and add additional subject matter that makes them a fortiori and independently patentable over these prior-art references. Accordingly, the applicant submits that the amended dependent claims 2 - 15, the amended dependent claims 17 - 26, and the amended dependent claim 28 are a fortiori patentable and should also be allowed.

Conclusion

For all the reasons given above, the applicant respectfully submits that the drawing sheets, specification, abstract, and claims are new in a proper form, and that the amended claims all define patentable over the prior-art references. Therefore, the applicant submits that this application is now in full condition for allowance, which action applicant respectfully solicits.

Conditional Request For Constructive Assistance

The applicant has amended the drawing, specification, abstract, and rewritten the amended claims of this application so that they are proper, definite, and define novel physical feature structures, which are also unobvious. Therefore, this application is submitted that patentable subject matter is clearly present. If, for any reason this application is not believed to be in full condition for allowance, the applicant respectfully

requests the constructive assistance and suggestions of Examiner pursuant to M.P.E.P. Section 2173.02 and Section 707.07(j) in order that the undersigned can place this application in allowable condition as soon as possible and without the need for further proceedings.

Very respectfully,

George J. Miao, Ph.D.

---------- Applicant Pro Se ----------

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Date: April 3, 2007

Inventor's Signature: